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(56) Documents Cited

GB 2313265 A EP 0781071 A1 WO 99/05850 A1
WO 99/03259 A2 JP 060284172 A

(58) Field of Search

On-Line - EPODOC, JAPIO, WPI

(54) Abstract Title

Generating alert signals according to ambient conditions

(57) A radio transceiver includes a system for generating alert signals. The system includes means 10,11,12 which sense and analyse one or more parameters of an ambient condition such as ambient sound. The system also includes an alert signal generator 15, 16 which generates an alert signal whose characteristics are adjusted automatically according to the analysed parameter or parameters. Thus the amplitude and frequency profile of a ringing signal may be optimised according to ambient noise. Alternatively, the alert signal generator may be disabled in the event that the sensing means detect a particular voice profile and/or at certain predefined times. The alert signal generator may be a vibrator.

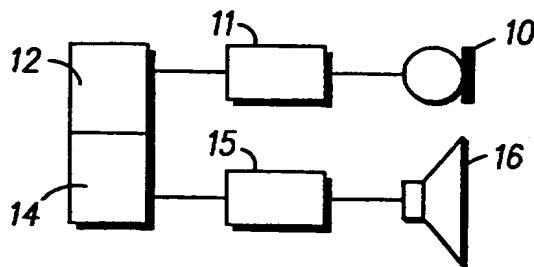


FIG. 1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

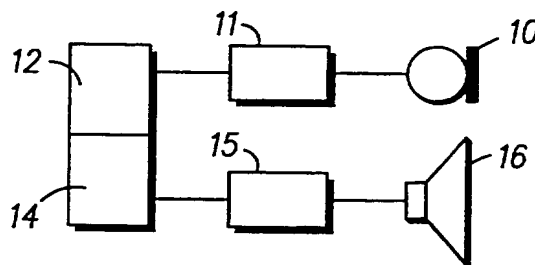


FIG. 1

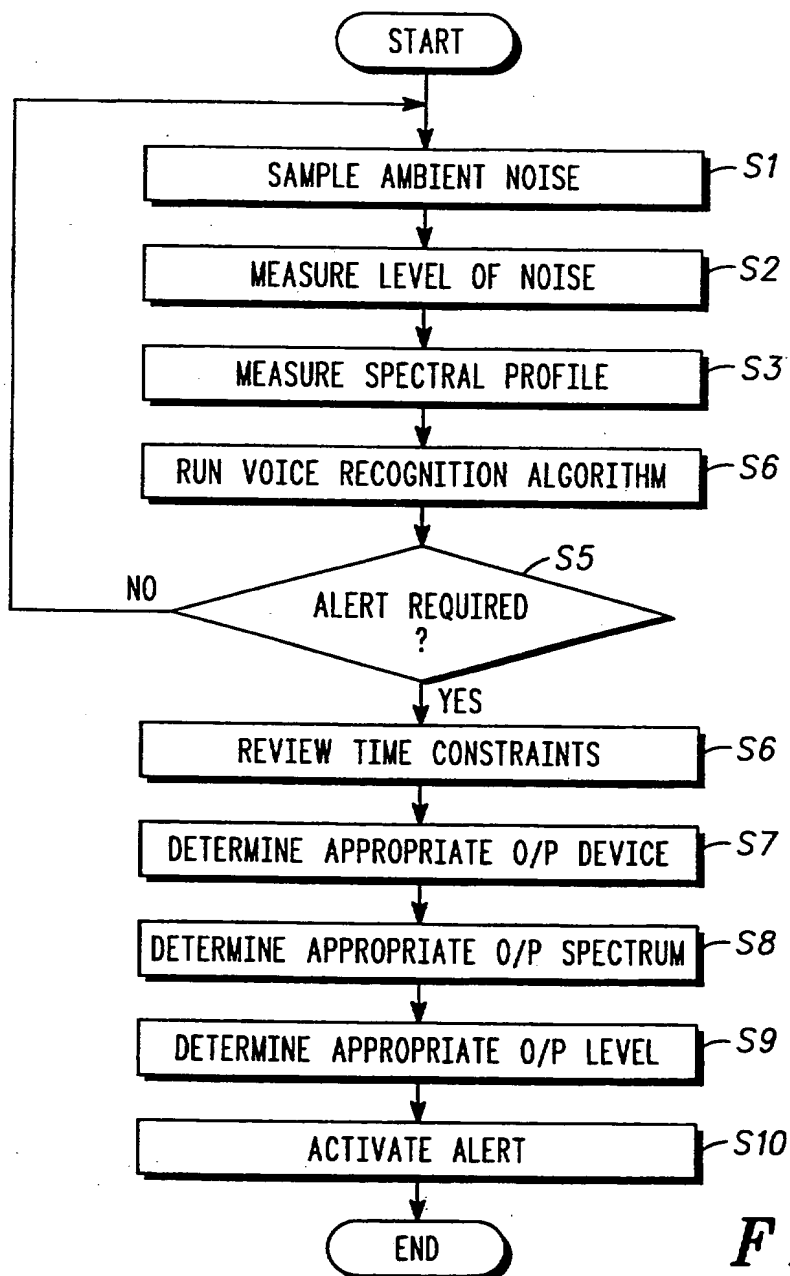


FIG. 2

Generation Of Alert Signals In Radio Transceivers

Field of the Invention

- 5 The present invention relates to the generation of alert signals in radio transceivers. In the context of the present specification the term alert signal is to be construed extremely generally and is intended to mean any signal generated by a device which is intended to alert a user of that device to a particular situation. For example, in the case of a mobile telephone, the alert
- 10 signal can be a ringing tone to alert a user of the telephone to the fact that there is an incoming call. In another type of device which is worn in close proximity to the body, the alert signal may take the form of a vibratory signal which is felt by a part of the body of the user.
- 15 The term radio transceiver is intended to include within its meaning mobile and portable telephones, mobile and portable radios and other wireless type devices such as personal digital assistants.

Background of the Invention

- 20 Alert signals generated in currently available devices are either fixed signals or signals which can be changed under the control of a user of the device which produces the alert. For example, in the case of a mobile telephone, a user of the telephone is normally given a wide selection of alert signals from which they
- 25 can select. This requires some manual operation by the user in order to select the appropriate alert signal. Such arrangements are limited and inconvenient since they require the intervention of a user in order to change the alert signal to suit ambient conditions.

Summary of the Invention

The present invention is concerned with a system for generating alert signals which does not have this limitation.

- According to one aspect of the present invention, there is provided a radio transceiver including an alert signal generating system for generating an alert signal having characteristics determined in accordance with a parameter or parameters indicative of an ambient condition, said alert signal generating
- 5 system comprising means for sensing the ambient condition and generating an electrical signal indicative of that condition, means for analysing said electrical signal to assess the value of at least one parameter of the ambient condition, and generating means for generating an alert signal, said alert signal generating means being operable in response to the analysis means in order to generate
- 10 an alert signal having characteristics determined in accordance with the value of the sensed parameter or parameters. The ambient condition may be ambient sound such as ambient noise. The alert signal may be an audible signal. Alternatively the alert signal may be a vibratory signal.
- 15 The analysing means may be arranged to sense the level of the ambient sound. Alternatively, or in addition, the analysing means may be arranged to sense the spectral content of the ambient sound.
- 20 The alert signal generating means may be operable to adjust the level of the alert signal according to the level of the ambient sound. Alternatively, or in addition, the alert signal generating means may be operable to adjust the frequency or frequency profile of the alert signal according to the sensed spectral content of the ambient sound.
- 25 The radio transceiver may be a mobile telephone apparatus. The system may be arranged so that generation of an alert signal can be inhibited at predetermined times. For example in the case of a mobile telephone the alert signal generating means can be programmed to prevent a ringing tone at a particular time of day, e.g. during a lunch break. Also the alert signal generating
- 30 system can be provided with voice recognition software to enable it to inhibit generation of an alert signal in the event that a particular voice profile or voice profiles are sensed.

In arrangements in accordance with the present invention the sensing means can be arranged to operate continuously. Alternatively it can be arranged to operate periodically.

- 5 According to another aspect of the present invention there is provided a method of operation of a radio transceiver comprising sensing an ambient condition and generating an electrical signal indicative of that condition, analysing said electrical signal to assess the value of at least one parameter of the ambient condition, and generating an alert signal, which has characteristics determined
10 in accordance with the value of the sensed at least one parameter.

Brief Description of the Drawings

- 15 The invention will be described now by way of example only, with particular reference to the accompanying drawings. In the drawings:

Figure 1 illustrates schematically an alert signal generating system for generating alert signals in a radio transceiver in accordance with the present invention, and
20

Figure 2 is a flowchart illustrating the steps which can be implemented by software operated by a processor of the system.

Description of Embodiments of the Invention

- 25 The alert signal generating system shown in Figure 1 of the drawings is intended to monitor ambient sound, such as ambient noise, to sense particular parameters of that sound and to adjust the characteristics of an output alert signal in accordance with those sensed parameters. It is particularly suitable for
30 implementation in a mobile or portable telephone, such as a digital portable- or mobile telephone operating in accordance with the GSM standard, i.e. as a GSM 'mobile station (MS)'. It will also be appreciated that it can also be

implemented in many other types of device. For example it can be incorporated in a mobile or portable radio and other wireless type devices such as personal digital assistants.

- 5 The system comprises a microphone (10) which generates an electrical signal indicative of the ambient sound in its vicinity. The electrical output from the microphone (10) is fed to an amplifier and filter circuit (11) which amplifies and filters the electrical signal and feeds it to an analogue-to-digital converter which forms part of a digital signal processor (12). In the digital signal processor the
- 10 electrical signal is digitised by the analogue-to-digital converter and then the signal is analysed to assess the level and/or spectral content of the ambient sound as represented by the electrical signal. The output of the digital signal processor which represents the assessed sound profile is fed to a
- 15 microprocessor (14). The microprocessor has an output connected to a tone generation circuit (15) which in turn is connected to a loudspeaker device (16) for generating an audible alert signal.

- In operation, when an incoming call is sensed, or some other situation identified which requires generation of an alert signal, the microprocessor (14) operates in
- 20 accordance with the sound assessment signal received from the digital signal processor (12) to control the tone generation circuit (15). The digital signal processor (12) controls the tone generation circuit (15) in such a way that the alert signal generated by the device (16) has a characteristic or characteristics which are determined in accordance with the sensed parameters of the ambient
 - 25 sound. In a very simple arrangement the alert signal generating system can be arranged to adjust the level of the audible alert signal in accordance with the level of the sensed ambient sound. Thus, if the mobile phone is being used in a noisy environment it will be arranged automatically to generate a louder alert signal and this does not require any intervention on behalf of the user.
 - 30 Alternatively, in very quiet situations a lower level alert signal can be provided. In some situations it may decide that a vibratory type alert is more appropriate, thereby avoiding the need to issue an audible alert.

- A more sophisticated arrangement can assess the spectral content of the ambient sound and issue an alert signal having an appropriate frequency or frequency profile. For example, in an area where there is a lot of low frequency background noise, the alert signal generating system can be arranged so that it automatically issues an audible alert signal having a frequency in a frequency range substantially above the frequency of that background noise. This means that the alert is more likely to be heard.
- 10 More sophisticated arrangements can be provided with voice recognition algorithms, allowing the system to recognise speech patterns in the ambient sound. The alert signal generating system can be programmed so that when it recognises such a speech pattern it operates in a particular way, e.g. by inhibiting issuance of an alert signal. This could for example be useful in the
- 15 situation where the user of the mobile telephone is in a meeting with a superior which is not to be interrupted. A further facility which can be provided is that of a timing arrangement which can, for example, function to inhibit alert signals at particular times during the day.
- 20 A system of the type shown in the drawing can be implemented in existing mobile telephones without the need to include additional hardware. All that is required is for the writing and loading of appropriate software for operation by the digital signal processor and the microprocessor. Given the description of operation set out above, the production of such software would be well within
- 25 the competence of the average programmer. Figure 2 is a flowchart illustrating the steps to be implemented by such software, in accordance with one particular embodiment of the invention. In this embodiment, voice recognition software has been included.
- 30 The first step S1 is to sample the ambient sound and then to measure the level of the sampled sound, see step S2. The spectral profile of the sampled sound is determined at step S3, and the sampled sound is analysed by a voice

recognition algorithm at step S4. At step S5, a decision is made as to whether or not an alert is required. If not, then the described sequence of steps begins again. If the decision in step S5 is that an alert is required, then a review of time constraints is carried out in step S6. The software then determines the
5 appropriate output device (step S7), the appropriate output spectrum (step S8) and the appropriate output level (step S9). Finally in step S10, the alert signal is activated.

Although the invention has been described above in terms of a mobile
10 telephone it will be appreciated that it can have application in other areas, for example pager and personal organisers which have a digital signal processing facility. The described principles could also be applied in other fields.

It will be appreciated that the present invention has the advantage that it
15 reduces the incidence of missed calls, because the alert signal generated by the system will have an increased probability of being recognised. Furthermore, the alert signal generating system permits a reduction in the consumption of power since it will be able to issue lower volume alerts in conditions where there is relatively little background noise. This can lead to a lengthening of the lifetime
20 of batteries used to power the device.

Claims

1. A radio transceiver including an alert signal generating system for generating an alert signal having characteristics determined in accordance with a
5 parameter or parameters indicative of an ambient condition, the alert signal generating system comprising:
- sensing means, for sensing the ambient condition and generating an electrical
10 signal indicative of that condition;
- analysing means, for analysing said electrical signal to assess the value of at
least one parameter of the ambient condition; and
- 15 alert signal generating means, for generating an alert signal, said alert signal generating means being operable in response to the analysis means in order to generate an alert signal having characteristics determined in accordance with the value of the sensed parameter or parameters.
2. A radio transceiver according to claim 1, wherein the ambient condition is
20 ambient sound such as ambient noise.
3. A radio transceiver according to claim 1 or claim 2, wherein the alert signal is an audible signal.
- 25 4. A radio transceiver according to claim 1 or claim 2, wherein the alert signal is a vibratory signal.
5. A radio transceiver according to any one of claims 2 to 4, wherein the
30 analysing means is arranged to sense the level of the ambient sound.

6. A radio transceiver according to any one of claims 2 to 5, wherein the analysing means is arranged to sense the spectral content of the ambient sound.
- 5 7. A radio transceiver according to claim 5, wherein the alert signal generating means is operable to adjust the level of the alert signal according to the level of the ambient sound.
- 10 8. A radio transceiver according to claim 6 or claim 7, wherein the alert signal generating means is operable to adjust the frequency or frequency profile of the alert signal according to the sensed spectral content of the ambient sound.
- 15 9. A radio transceiver according to any preceding claim, wherein the generation of an alert signal can be inhibited at predetermined times.
- 20 10. A radio transceiver according to any preceding claim incorporating voice recognition software to enable the alert signal generating system to inhibit generation of an alert signal in the event that a particular voice profile or voice profiles are sensed.
- 25 11. A radio transceiver according to any preceding claim, wherein the sensing means is arranged to operate continuously.
- 30 12. A radio transceiver according to any one of claims 1 to 10, wherein the sensing means is arranged to operate periodically.
13. A method of operation of a radio transceiver comprising sensing an ambient condition and generating an electrical signal indicative of that condition, analysing said electrical signal to assess the value of at least one parameter of the ambient condition, and generating an alert signal which has characteristics determined in accordance with the value of the sensed at least one parameter.

14. A method according to claim 13, wherein the ambient condition is ambient sound such as ambient noise.
- 5 15. A method according to claim 13 or claim 14, wherein the alert signal is an audible signal.
16. A method according to claim 13 or claim 14, wherein the alert signal is a vibratory signal.
- 10 17. A method according to any one of claims 14 to 16, wherein the step of analysing assesses the level of the ambient sound.
18. A method according to claim 17, including adjusting the level of the alert signal according to the level of the ambient sound.
- 15 19. A method according to any one of claims 14 to 18, wherein the step of analysing assesses the spectral content of the ambient sound.
- 20 20. A method according to claim 19, including adjusting the frequency or frequency profile of the alert signal according to the sensed spectral content of the ambient sound.
21. A method according to any one of claims 13 to 20 including inhibiting generation of an alert signal at predetermined times.
- 25 22. A method according to any of claims 13 to 21 including analysing voice signals and inhibiting generation of an alert signal in the event that a particular voice profile or voice profiles are being sensed.
- 30 23. A method according to any of claims 13 to 22, wherein the sensing is carried out continuously.

24. A method according to any one of claims 13 to 22, wherein the sensing is carried out periodically.
25. A radio transceiver substantially as hereinbefore described with reference to
5 and as shown in the accompanying drawings.
26. A method of operating a radio transceiver substantially as hereinbefore described.



INVESTOR IN PEOPLE

Application No: GB 0001349.0
Claims searched: 1 to 24

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Examiner: Jared Stokes
Date of search: 15 August 2000

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R):

Int Cl (Ed.7):

Other: On-Line - EPODOC, JAPIO, WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
Y	GB 2 313 265 A (NEC) See page 9 lines 24-27	9,21
X,Y	EP 0 781 071 A1 (Sagem) See abstract	X: 1-8, 11-20 Y: 9,21
X,Y	WO 99/05850 A1 (Northern) See whole document	X: 1-8, 11-20 Y: 9,21
X,Y	WO 99/03259 A2 (Ericsson) See whole document	X: 1-8, 11-20 Y: 9,21
X,Y	JP 060284172 A (Mitsubishi) See WPI abstract accession No.1994-362013	X: 1-8, 11-20 Y: 9,21

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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